

Laut, two Prince Albert's Curassows (*Crax alberti*) from Columbia, purchased; two Common Foxes (*Canis vulpes*), four Chilian Pintails (*Dafila spinicauda*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE COMET OF 1106.—Amongst the comets which were thought to present certain indications of identity with the great comet of 1843 was that recorded by a large number of European historians, as well as in the Chinese Annals, in the year 1106. The circumstances of its appearance may be thus briefly stated: On the 4th of February, or, according to others, on the 5th, a star was seen which was distant from the sun "only a foot and a half"; it was observed from the third to the ninth hour of the day. Matthew Paris and Matthew of Westminster distinctly term it a comet. Pingré, not having the experience of the comet of 1843 as a precedent, questioned the possibility of seeing one of these bodies at so small a distance from the sun as the above expression may be taken to imply. Now, however, we are able to connect, with much probability, the star viewed in the day-time with the comet which on February 7 was discovered in Palestine about the commencement of the sign Pisces. On this day, we are told by three contemporary writers, a comet appeared in that quarter of the sky where the sun sets in winter, and occasioned great surprise; a white ray extended from it to a great distance. From the time of its first appearance "the comet itself and the ray, which had the whiteness of snow, diminished day by day." Others, on the contrary, say that the train, which had a more than milky whiteness, appeared to increase daily. In the west of Europe it does not seem to have been remarked till February 16 or 18. According to some writers it was visible only a fortnight, others say that it continued to shine for forty days, or during the whole of Lent, from February 7 to March 25; an eye-witness records that after fifty days the most acute vision only sufficed to distinguish it with difficulty. There is similar contradiction respecting the aspect of the comet, though most of the historians testify to its great brightness and apparent magnitude. On February 10, according to Gaubil's manuscript, used by Pingré for his "Cometographie," it was near the end of the sign Pisces, with a tail 60° in length. European chronicles mention that the tail extended to the beginning of the sign Gemini, under the constellation of Orion, whence, as Pingré points out, the latitude of the comet must have been south, while as the sun was in 25° of Aquarius, it could hardly be less advanced than 10° or 12° of Pisces to be seen in the evening after sunset. Thence, about February 16 or 18, it moved to the western quarter of the heavens, and after many days had elapsed, as Pingré records: "La comète partit du côté du septentrion vers l'occident: sa queue, semblable à une grande poutre, regardait la partie du ciel qui est entre le septentrion et l'orient; on la voyoit jusque vers le milieu de la nuit. Durant vingt-cinq jours elle brilloit de la même manière à la même heure." Williams, in his account of comets mentioned in the Chinese annals, has a notice of the one in question. In the reign of Hwuy Tsung, the 5th year of the epoch Tsung Ning, the 1st moon, day Woo Seuh (1106, February 10), a comet appeared in the west. It was like a great Pei Kow (a kind of vessel or measure). It appeared like a broken-up star. It was 60 cubits in length and 3 cubits in breadth. Its direction was to the north-east: it passed the sidereal division Kwei (determined by β , δ , ϵ Andromedæ and stars in Pisces), and through the divisions Lew (determined by α , β , γ Arietis), Wei (by the three stars of Musca), Maou (by the Pleiades), and Feih (by α , γ , δ , &c., Tauri). It then entered the clouds and was no more seen. Williams, doubtless influenced by this last expression, and the object having been said to resemble a broken-up star, and probably overlooking the presence of the comet recorded by the European historians in the same part of the sky, adds: "This appears to have been a large meteor, as it seems to have been seen for a short time only." But there can be little hesitation, we think, in identifying the body remarked in China with the European comet, its track through the constellations, as given by Williams, which agrees with Gaubil's manuscript, representing very satisfactorily the particulars found in the European chronicles.

In 1843 Langier and Mauvais, reducing their elements of the great comet of that year to 1106, and assuming the perihelion passage to have taken place on February 3, found the following geocentric track.

Feb. 4, Long.	324°	Lat.	- 3°	Feb. 16, Long.	4°	Lat.	- 23°
7, " "	335, " "	- 10	March 5, " "	40, " "	- 28		
10, " "	345, " "	- 16	25, " "	60, " "	- 27		

And they conclude, "en admettant que la comète de 1106 est une apparition de la comète de 1843, toutes les observations sont satisfaites." It is not easy to see how such an inference can have been drawn in face of the circumstances mentioned by the historians during the later period of the comet's visibility, when it was seen to the north of west, with a tail extending towards the north-east; a condition wholly incompatible with the elements of the comet of 1843, which body did not remain on the northern side of the ecliptic so long as three hours. On reducing Hubbard's parabola of 1843 to 1106 we have the following positions, assuming perihelion passage February 3 5 G.M.T.:

G.M.T.	Long.	Lat.	Log. ν .	Log. Δ .	Intensity of Light.
	h.				
Feb. 4, 0 ...	322° 9 ...	- 1° 7 ...	8.8080 ...	9.9704 ...	277° 6
19, 8 ...	12° 6 ...	- 25° 1 ...	9.8377 ...	9.9543 ...	2° 6
March 25, 12 ...	60° 3 ...	- 27° 3 ...	0.1725 ...	0.2619 ...	0° 13

These places are in agreement with those found by Laugier and Mauvais; that for March 25 corresponds to R.A. 63° 7° Decl. - 6° 4°.

It is well known that the comet of 1106, with better reason, was long supposed to be identical with the famous comet of 1680. That point has been discussed elsewhere. Our object now, since the possibility of the identity of the comet of 1106 with that of 1880 and 1843 has been again mooted, is to draw attention to the main difficulty that exists in the acceptance of the idea.

PHYSICAL NOTES

M. ANTOINE BREGUET, at a lecture upon Recent Advances in Telegraphy, exhibited some ingenious apparatus illustrating the principles of the duplex and quadruplex telegraph, the actions of the electric currents being most successfully represented by the flow of water in tubes.

PROF. CARMICHAEL describes, in the *American Journal of Science*, a device for rendering the sonorous vibrations of a flame visible to a whole audience. He passes coal-gas through a König's manometric capsule, and then leads it by a tube into a burner inclosed in a small mica cylinder or lantern, which is rotated either in a vertical or a horizontal plane. The ring of light thus produced is broken up by the sonorous vibrations into a serrated form, the forms of the serrations varying with the nature of the sound. To increase the brilliance of the light the gas is previously passed over a sponge soaked in some volatile hydrocarbon such as "gasoline" or "benzoline," and oxygen is also supplied into the mica lantern. A shrill whistle produces very fine serrations invisible thirty feet away. The human voice at ordinary loudness produces serrations two or three inches deep round the ring. A modified capsule placed upon the various parts of a vibrating body serves to investigate their modes of vibration, nodal points, &c.

SOME curious experiments on the magnetic behaviour of elder-pith have lately been made by M. Ader. Pith-balls placed in a powerful magnetic field are strongly attracted.

PROF. ROWLAND contributes a long and careful memoir upon Thermometry and the mechanical equivalent of heat to the *Transactions of the American Academy of Arts and Sciences*. His results differ by about 25 per cent. from the accepted numerical determinations of Joule's equivalent. Amongst other matters noticed in this memoir is an alleged decrease in the specific heat of water at higher temperatures.

CONTEMPORARY gives the following method of illustrating the indestructibility of matter:—Two sealed glass tubes of equal weight, one of them containing oxygen and a little powdered charcoal, are prepared. The charcoal may be caused to burn away completely by heating it by means of a small flame. On placing the two tubes on a balance it will be seen that there has been no variation in weight.

THE process of electrodeposition is now finding a useful application in the production of bronze statuary, where it promises to supersede the process of casting. The Electrometallurgical Company of Brussels have just produced a colossal statue of Van

Eyck by the deposition of copper electrically upon the clay model. The production of bronzes may be readily carried out on a small scale by the following process communicated to the *Natural History Journal*, and which possesses some elements of novelty. Take any plaster figure or group, boil in sterine, then blacklead and plunge in a copper bath. Attach a very weak battery, and deposit very slowly a thin coating of copper. Now remove from the bath, and bake in an oven until the plaster model shatters out in dust. You have now a very thin copper reproduction of your model. Varnish this outside so as to prevent the further deposition, and replace in the bath. The copper will now be deposited on the inside surface, and you can thicken up to any desired point. For this second process a much stronger battery may be used.

MM. LECLERC and Vincent have described to the Physical Society of Paris an electrical instrument which will automatically record the notes played upon a piano. It can be adapted to a piano of any construction.

CLÖE's thermoelectric pile has been recently improved by an addition which obviates the injurious effect of sudden and excessive heating of the junctions arising from alteration in the pressure of the gas. This safety-apparatus consists of a small glass vessel about half filled with water, and closed by a cork stopper, through which pass two tubes, one going to the bottom and being a branch of the tube by which the gas comes to the pile, while the other is shorter, and conducts any gas that may pass through it from the vessel to a gas-burner on another branch constantly lit. If the pressure of the gas is weak the water closes the mouth of the longer tube; if it increases the gas issues in bubbles in the liquid and rises through the shorter tube to the gas jet, where it is lit. The arrangement is a sort of safety valve, and prevents the pressure from exceeding a certain amount, which is regulated at will.

M. MARCEL DEPREZ has devised an ingenious apparatus for transmitting a movement of rotation by electricity. The apparatus is composed of a transmitter and a receiver. The transmitter consists of two ordinary split-collar commutators set upon a common axis, but adjusted at right angles to each other. The receiver consists of two longitudinal armatures carrying coils of wire as employed in the earlier Siemens' magneto-electric machines. These also run on a common axis and in positions at right angles to one another: and they are placed in the magnetic field between the poles of a permanent magnet. Currents generated by a battery pass through the transmitter and are conveyed by wires to the receiver. For every position of the axis of the transmitter there is one position—and one only—of stable equilibrium for the axis of the receiver. Hence the axis of the receiver follows all the movements of the transmitter; turns at the same rate and in the same direction as the transmitter may be turned; and makes the same number of revolutions precisely to within a quarter of a revolution.

GEOGRAPHICAL NOTES

THE new number of the Geographical Society's *Proceedings* is chiefly occupied with a narrative of Lieut. G. T. Temple's voyage on the coasts of Norway and Lapland, illustrated by a map on which the depths of the ocean are well shown in colour, and by Mr. E. Hutchinson's account of Mr. Ashcroft's ascent of the River Binué last August, with remarks on the systems of the Rivers Shary and Binué. With the latter paper is given a reduction of Mr. Flegel's map of the Upper Binué from his own surveys, recently issued by Hellfarth of Gotha. An interesting letter from Mr. Thomson is afterwards given, furnishing information as to the progress of the East African Expedition. Among the geographical notes may be mentioned a summary of the most recent rumours respecting Prejevalsky and a description of routes from Dzungaria into Tibet. There is also an account of a visit paid by Mr. Woolley, of the Consular service, to the Island of Tsushima and Corea, and of the Rev. J. Chalmers's recent explorations in the interior of New Guinea, in the course of which he traversed a considerable extent of previously unknown country. The notes are followed by a communication on the "Tal-Chotiali Route from India to Pishin and Candahar," furnished by Mr. G. W. Vyse, who was attached to the Tal Chotiali Field Force, in correction of previous statements made respecting this route.

BY a note received on April 28 we learn that the Howgate Arctic Expedition Bill passed the House of Representatives at

Washington on the 15th inst., and has gone to the Senate for final action. "This is a great step in advance, and augurs well for Government aid to the Expedition."

UNDER the title of "La Exploradora" an association has been formed in Spain, through the instrumentality of Señor Don Manuel Iradier, for the exploration and civilisation of Central Africa, and in furtherance of its objects commenced the publication of a *Boletín* in March. This association proposes to despatch an expedition from the west coast with what appears to be a somewhat ambitious programme. Its starting-point would be the Bay of Corisco, whence it would traverse the Sierra de Cristal, and afterwards march by way of Mount Onschiko and the River Eyo towards Lake Albert. If successful so far, it would then visit Mount Gambaragara, in the Usongora range, to study the peculiar population said to be found there. Then, turning in a north-westerly direction, it would make its way back to the Gulf of Guinea by Lake Liba and the Cameroons River. It is proposed that this expedition should start at latest during the month of June, but we are not aware whether the necessary funds for its journey of fourteen months have been provided. In the course of their march it is intended that the members of this expedition should devote themselves to the study of all the important problems yet unsolved in the central region of the African continent, and especially whether there be any connection between Lake Liba and the rivers Shary and Binué.

IT is stated that the Comte de Semellé is about to return to Africa, in order to undertake an exploring expedition up the river Binué.

DR. REGEI, director of the Imperial Botanical Garden of St Petersburg, gave an account of the Flora of Turkestan at a recent meeting of the St. Petersburg Horticultural Society. Turkestan may be divided into two distinct parts—the west, with a very mild climate, and the east, the climate of which is almost that of St. Petersburg. The flora of Turkestan is exceedingly varied, much resembling that of Central Asia; plants proper to the climate of Europe grow there in small numbers. The eastern part abounds in Alpine specimens, and in general its vegetation approaches that of Europe, although quite as often plants are met with which are the sole product of Central Asia. Turkestan possesses neither lily nor tulip, and has very few conifers.

LAST week we referred to Mr. E. Whymper's mountaineering exploits in South America. Some further details are given by Mr. Whymper himself in a letter to Mr. F. F. Tuckett in Tuesday's *Times*. It is dated from Quito, March 18. He says:—"You will be glad to hear that I have succeeded in polishing off Chimborazo, Corazon, Sincholagna, and Antisana. We have also passed twenty-six consecutive hours on the top of Cotopaxi. This last I reckon a feat, and I am not aware that any one has ever before encamped at so great an altitude as 19,500 feet. Antisana is the most difficult of those we have been up, and few more difficult ascents have ever been made. We are now going off to Cayambe, the mountain on the Equator, and shall try on the same journey to polish off Saranen and Cotocachi. Cayambe is thought to be an active volcano, but it is not certain that this is the case, neither is its height well determined. The height of Saranen is not known, but it is high. Cotocachi is the volcano which destroyed Ibarra some years ago, and is reputed to be 16,300 feet high. We have grown out of being affected by rarefaction of the air, and can be quite gay and lively at 19,000 feet. At first I was fairly knocked over by it, and was rendered quite incapable. The Carrels also were nearly as bad. The climate of Ecuador is the most utterly abominable that can be imagined. We have not had one single day fine from beginning to end, and not one view from a mountain top. An hour of clear weather from 6 to 7 a.m. is the most you can reckon on, and after that everything is bottled up in a mist. We carry about mercurial barometers everywhere, and boil water to an extent that would delight your heart."

IN the May number of their *Chronicle* the London Missionary Society announce the departure, on April 16, of a new expedition for East Central Africa, to reinforce the weakened and scattered party now there. The Rev. A. J. Wookey goes to join Mr. Hore at Ujiji, the Rev. D. Williams to Urambo, where Dr. Southon now is, and Mr. W. S. Palmer, a medical missionary, to Uguha, where, we presume, he will be stationed at Mtowa, near the Lukuga Creek.

IN their just-issued eighty-eighth Report the Committee of the Baptist Missionary Society summarise the efforts of their